REMARKS

Claims 1-5 and 7-11 are pending. Claims 4, 5, and 10 were previously presented. Claim 11 is new. Claims 1-3 and 7-9 have been amended to further define Applicant's invention. No new matter has been added in the new or amended Claims.

Support for new Claim 11 can be found in the specification at page 11 lines 17-20.

Support for the amendments in Claims 1 and 7 can be found in the specification at page 11 lines 14-17 and in Figure 1.

Rejections under 35 U.S.C. 103(a)

1. Claims 1, 4-5, and 7-10 stand rejected under 35 U.S.C § 103(a) as being unpatentable over Fronsman et al. (Fronsman) US 3,825,484 in view of Japanese patent 51-119632. Applicants respectfully disagree.

As noted in Applicant's previous Response to the non-Final Office Action mailed April 05, 2007, the Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 17, 86 S.Ct. 684, 694 (1966) set out the factual inquiry which the various district courts and the Patent Office must follow in determining obviousness. According to the Supreme Court, an obviousness analysis requires a determination of the: (1) scope and content of the prior art; (2) differences between the prior art and the Claims at issue; (3) level of ordinary skill in the pertinent art.

Scope and Content of the Prior Art

Fronsman discloses an apparatus comprised of: an unsealed casing; a plurality of rotating cathodes; a plurality of stationary anodes; a means for removing copper from the cathodes; and a means for collecting the copper in a bin. See Fronsman at Figures 1, 2, and 6; column 1 lines 60-72; column 5 lines 1-47; column 4 lines 18-19, 43-46; and column 5 lines 21-44.

The Japanese patent document 51-119632 discloses a method for treating copper etching solution in an unsealed electrolytic cell containing a cathode and a plurality of anodes. Cuprous chloride is oxidized to cupric chloride at the anodes and metal copper is generated at the cathode. The cathode is separated from the anodes by a diaphragm, described as the cathode chamber. Copper accumulates at the bottom of the cathode chamber where a potential is applied to prevent dissolution of the copper. Abstract and Figures 1 and 2.

Differences Between the Prior Art and the Claims at Issue

Amended claims 1 and 7 are directed to a method and an apparatus, respectively, for regenerating etching solutions containing iron. Amended Claims 1 and 7 require a sealed electrolysis cell such that gas, for example oxygen gas, is prevented from escaping from the etching solution. Further, amended Claims 1 and 7 require the etching solution to contact the cathode first, then contact the anode, and then exit the cell.

The Fronsman apparatus is not sealed in the manner required by the claims, as indicated in Figure 2 where the dotted line, numbered as 27, represents the liquid level. See also Fronsman at column 4 lines 43-46. Fronsman shows that the cathodes and anodes are positioned within the cell in such a manner that the etching solution contacts the cathodes and anodes at the same time until flowing out of the cell. See Figure 1 of Fronsman.

The Japanese patent discloses a method for oxidizing cuprous chloride in an etching solution to cupric chloride, not Fe(II) to Fe(III). The method, as described in Figures 1 and 2, uses an unsealed cell that contains a cathode and a plurality of anodes. The anodes are separated from the cathode by a diaphragm and the flow pattern allows the etching solution to contact the cathode and anode at the same time.

In summary, Fronsman and JP 51-119632, combined, disclose a cell that does not prevent gas from escaping the etching solution and that has a flow pattern allowing the solution to contact the cathode and anode at the same time. The claimed invention on the other hand requires an electrolytic cell that prevents gas from escaping the solution and a flow pattern that results in the etching solution contacting the cathode first then the anode.

Level of Ordinary Skill in the Pertinent Art

The Office asserts that "the scope of a 'sealed cell' is broad" and that the cell in Fronsman is a sealed cell because "Fronsman...uses a cover." Final Office Action page 3. Applicants respectfully submit that the amended claims of the instant invention disclose a closed system that does not allow gas to escape the system or the electrolyte. Oxygen gas, generated at the anode and trapped in the electrolyte, oxidizes Fe(II) to Fe(III). Because all the oxygen is retained in the electrolyte (etching solution), the efficiency of the system is enhanced. See the specification at

page 11 lines 14-17. The Fronsman apparatus contains "head-space" into which gases can escape. This is clearly shown in Fronsman by Figure 2 wherein line 27 represents the "liquid level" of the electrolyte. Fronsman at column 4 lines 43-46. With regard to JP 51-119632, the specification discloses an open air cell in which gases can escape to the atmosphere. Specification at page 173, Figure 2. Therefore, neither Fronsman nor JP 51-119632, either alone or in combination, disclose or suggest an element of the claims, i.e., a closed system that prevents gas from escaping the electrolyte.

Further, the Office asserts that:

> "[a]pplicants argue that the Fronsman apparatus would allow the electrolyte to contact both electrodes at the same time, whereas the present claims require the contact first with the cathode with subsequent flow to the anode. The present apparatus does not include a membrane to separate the electrodes. Accordingly, the electrolyte would contact both the electrodes, since the current would only pass through the electrolyte between the electrodes." Office Action pages 2 and 3.

Applicants do not deny that, in the course of the claimed method, the electrolyte will ultimately contact both electrodes since a current can pass through the electrolyte only between the electrodes. However, the claimed invention requires that a given portion of the etching solution to be regenerated contacts the cathode of the electrolysis cell first, before it is allowed to flow to and contact the anode. Neither Fronsman nor JP 51-119632 disclose or suggest structure which would result in the solution contacting the cathode and anode in this temporal order.. This feature of the claimed invention prevents "back-mixing" or, in other words, prevents Fe (III) that was oxidized at the anode from being reduced back at the cathode to Fe(II), thereby improving efficiency. Specification, page 8, lines 31-36 and page 9, lines 5-6.

It also appears from the above quote that the Office is arguing that "a membrane to separate the electrodes" would be necessary for the temporal order of contact to take place. . Applicants respectfully submit that a membrane or diaphragm is not necessary to effect the temporal order required by the instant claims. The present invention requires the cathode, anode, inlet, and outlet, to be arranged in an manner to achieve the claimed effect of contacting the cathode first and then the anode before exiting the cell. This is made quite clear by Figure 1. Neither Fronsman nor JP 51-119632 disclose the element of contacting cathode and anode in a

definite order wherein the electrolyte exits the cell after contacting the anode to prevent any "backwash."

One skilled in the art, based on Fronsman and the Japanese references, could not predict the apparatus (or method) of the instant claims. Both Fronsman and the Japanese reference describe open systems where the flow pattern allows the etching solution to make contact with the cathodes and anodes simultaneously. There is no suggestion nor teaching within the cited documents, explicit or implicit, to combine the following elements disclosed in amended claim1: a sealed electrolytic cell that prevents gas from escaping; a flow pattern where the etching solution contacts a cathode first followed by an anode and then exits the system; means for removing copper metal from the cathode; means for collecting the copper metal; applied potential across the copper metal; and no ion exchange membrane or diaphragm.

Two elements of the instant invention: (1) flow pattern and (2) a sealed cell that prevents gas from escaping the electrolyte are neither taught nor suggested by the Fronsman and JP 51-119632 references, either alone or in combination. There is nothing in the prior art that suggests an etching system that requires these features. Applicants therefore respectfully submit that the Office has not made out a *prima facie* case of obviousness. The differences discussed above would not have been obvious to one skilled in the art at the time the invention was made. The Supreme Court, quoting *In re Kahn*, stated that "rejections [based] on obviousness cannot be sustained by mere conclusionary statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR v. Teleflex Inc.* 127 S. Ct. 1727, 1741 (2007). The required "rational underpinning" is absent here.

2. Claims 2 and 3 stand rejected under 35 U.S.C § 103(a) as being unpatentable over Fronsman in view of the Japanese patent, and further in view of Harms US 3,933,606. The claimed method varies the flow of electrolyte and/or the current in the electrolysis cell by measuring the concentration of Fe(II)/Fe(III) or copper. Harms discloses a method of purifying water in which voltage is varied across a plurality of plates based on the conductivity of the water.

Applicants respectfully submit that the combination of Fronsman, JP 51-119632, and Harms does not disclose all the elements of claims 2 and 3. In particular, the combined

references do not disclose a method for regenerating etching solutions containing iron comprising an electrolyte flow pattern that contacts a cathode first and an anode second in a sealed or closed system that adjusts electrolyte flow and/or current across the cell by measuring concentrations of Fe(II)/Fe(III) or copper.

In view of the above amendments and remarks, Applicants respectfully submit that the pending claims are allowable. Reconsideration of this application is respectfully requested and a favorable determination is earnestly solicited.

Applicants urge the Examiner to contact Applicants' undersigned representative at (312) 913-0001 if the Examiner believes that this would expedite prosecution of this application.

Respectfully submitted,

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